The Evolution and Changing Geographical Structure of World Agri-food Trade, 1951-2000[1]

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Introduction

The second half of the twentieth century saw unprecedented economic growth, particularly in the decades of capitalism's golden age[2]. *Per capita* incomes rose generally the world over until the crisis of the 1970s, and expansion in fact continued overall in the ensuing decades, although the pattern of development varied widely. This phenomenon is reflected in the spectacular growth of international trade. According to Maddison (2001), trade flows increased rapidly between 1950 and 1973 and surpassed all previous historical periods, despite the slowdown between 1973 and 1988. Furthermore, trade grew at a faster rate than output, resulting in intense integration of markets.

In this context, agricultural trade experienced unparalleled growth between 1951 and 2000, expanding much faster than in earlier periods. It was also in this period when the direction, make-up and structure of international trade shifted in favour of exchanges of manufactured goods between industrialised nations[3]. In fact, the percentage of total international trade represented by agricultural goods declined

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2. Temin (2002).
3. Krugman (1995).

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sharply over this period. While agricultural and food products accounted for 43.0 per cent in 1951, this share had shrunk to just 6.7 per cent at current values by 2000.

The period also witnessed changes in the direction, composition and structure of international agricultural trade, in which Europe played a key role. On the one hand, agricultural trade became increasingly concentrated among the developed countries[4]. On the other, trade in high-value-added products and processed foods grew ever more important, tending to displace basic products[5].

The evolution of world agricultural trade and changes in the share of different regions during the second half of the twentieth century is not an issue that has received much attention in the literature to date. Although some papers have analysed long-run trends in farm trade[6], the quantitative base has always been incomplete, including only some products or the trade flows of the leading nations. While the World Trade Organization (WTO) has estimated the evolution of total agricultural trade for this period, the data is not broken down by products or countries, and a single deflator was used for all agri-food products to obtain the volume series.

In our view, analysis of the evolution of farm trade over the second half of the twentieth century is key to understanding the profound changes that have taken place in the process of economic globalisation, as the share of the world's different regions changed substantially over this period with far-reaching implications for their economic development.

In this context, our objective is to examine the performance, evolution and changing geographical structure of agri-food trade in the second half of the twentieth century. To this end, we have constructed a set of both aggregate series and breakdowns by region, which we shall compare with agri-food growth rates in other historical periods, the evolution of the world economy and the expansion of trade in other products.

In our view, this study greatly expands our understanding of the evolution and structure of world agricultural and food trade in this period. In the first place, we have constructed a new data base, broken down by regions and products. Furthermore, we perform econometric analyses of these new series to throw light on their behaviour and allow a clearer explanation of the evolution of world agricultural and food trade and the participation of different geographical regions. Finally, we compar the evolution of agri-food trade with total trade, and we propose a demand-side model to highlight the key role of the different income elasticities of both to explain their unequal evolution.

Our results confirm that international farm trade grew very rapidly in historical terms throughout the second half of the 20th century. However, its share of total world trade declined sharply. This occurred not only because the evolution

4. Hertel *et al.* (1999).
5. McCorriston and Sheldon (1998), Rae and Josling (2003), Serrano and Pinilla (2009).
6. Stern (1960), Thorbecke and Condliffe (1963), Hathaway (1979), Tarrant (1985).

of prices was largely unfavourable, but also because growth did not keep pace in volume terms with the fast expanding trade in manufactured goods and other raw materials (notably energy products). The study thus clearly reveals the dwindling importance of farm trade in the second era of globalisation compared with its key role in the first. We are also able to show the major impact of international economic circumstances on trade flows in agricultural and food products. Finally, we look at shifts in the relative importance of different regions of the world in farm trade, highlighting the waning role of the developed nations as the leading importers of agri-food products as Asian imports grew.

This study is divided into three sections, followed by our conclusions and an appendix, which explains in detail the construction of the quantitative series used. The first section considers the development of agricultural and food trade in volume terms. It begins with an econometric analysis of the series constructed to identify growth phases in agri-food trade, and continues with a description of the situation in each period as it relates to the quantitative evolution of agricultural trade flows. We then go on to compare the evolution of total trade and agri-food trade, exploring the different effects of income growth. The final section looks at the evolution of international agri-food trade broken down by economic regions. We end the paper with our main conclusions.

The evolution of international agricultural trade in volume terms

Econometric analysis of the series

In order to perform this study, we have constructed world agricultural and food trade series based on the trade figures collated by the Food and Agriculture Organisation of the United Nations (FAO). These figures are available in both paper and electronic formats[7]. The main problem with this data is that only a relatively small number of countries were included in the yearbooks until around 1960, covering most of Europe but very patchy for the rest of the world. Consequently, we have had to make a number of estimates. Based on these sources, we have obtained a homogeneous, representative annual series for total agricultural trade at current prices. Meanwhile, we prepared price indices for the various groups of products, applying these to deflate the relevant current price series (see Appendix) in order to obtain a series for international agricultural trade by volume.

Our main contribution is that we have obtained not only a uniform and representative annual series for total world agricultural and food exports, but we have also managed to break the data down by major economic regions. Moreover, we have performed a battery of estimates to obtain series that go back beyond 1960, the first year for which full data are available, to 1951. Finally, by creating price indices for the various groups of products concerned in agricultural trade, we have

7. FAO Trade Yearbooks (FAO, 1947-2000); FAOSTAT data base (FAO 2004).

also been able to deflate each series at current values and obtain volume series. The use of this disaggregation method to deflate the series is the main difference between this study and the World Trade Organisation's world agricultural trade series, the only one existing for the second half of the twentieth century[8].

On this basis, we use time series techniques to identify break points or discontinuities in the series and examine the nature of these shocks, their impact and their influence on the trend. This provides us with the information necessary to analyse the different stages in the evolution of agricultural and food trade.

To begin with, we carried out conventional unit root tests on the world agricultural and food export series by volume for the period 1951-2000 in order to identify the existence of structural shocks. Our initial finding is that the aggregate series is non-stationary[9]. Thus, the results of the augmented Dickey-Fuller test (1981) and the Philips-Perron test (1988) confirm the existence of a unit root.

TABLE 1

UNIT ROOT TESTS OF THE LOGARITHM OF THE AGRI-FOOD TRADE SERIES BY VOLUME, 1951-2000

	DFA	Significance	PP	Significance
World	-3.62	**	-3.01	*
Europe	-0.09	*	-0.75	*
Asia	-1.64	*	-4.72	
North and Central America	-2.25	*	-2.28	*
Oceania	-1.58	*	-4.44	
South America	-1.29	*	-5.05	
Africa	-2.43	*	-2.52	*
Former USSR	-2.58	*	-2.28	*

Note: T-statistic scores for the coefficient of the retarded variable $XAGR_{t-1}$. The functional form was tested with 3 retards.

$\Delta t = \mu + \beta_t + \gamma X (-1) + \Sigma\delta_i \Delta X_{t-j+1} + \varepsilon_t$.

Critical values at 1%, 5% and 10% are -4.156, -3.504 and -3.181 respectively.

(significant t-ratios: * at 1*; ** at 5%; and *** at 10%)

T=49

8. WTO (2003).

9. Two types of autoregressive processes may be distinguished in time series studies, resulting in different statistical dynamics. Thus, where the variance in the series is stationary the trend will be deterministic, but it will be stochastic if the series exhibits non-stationary properties in the variance. This has profound economic implications. In the first case, an external shock will not affect the long-term pattern but will be limited to a cyclical episode, after which the series will return to trend. In the second case, however, shocks result in permanent changes. In historical terms then, the past conditions the present to a greater extent where data series are non stationary.

Second, we tested the hypothesis of structural change to establish the nature of the discontinuities found, which of course means seeking to establish whether we are in the presence of non-stationary series involving long-run changes of level or trend. As proposed by Perron and Vogelsang (1992), we have used two structural change tests in which the break year is endogenously determined. The first is the "Additive Outlier Model" (AO), where the structural change arises instantaneously. The second is the "Innovational Outlier Model" (IO), where the change in the median is not instantaneous but gradual, affecting the series trend and, therefore, various periods. Based on the work of Clemente et al. (1998), meanwhile, we applied the same unit root tests in those cases where the series displayed two structural changes.

The following equation represents in a general form the models to be tested:

$$y_t = \mu + \beta_t + \gamma_{t\text{-}1} + \sum_{i=1}^{k} c_j \Delta X_{t-j} + \alpha DU_{it} + \delta TDU_{it} + \zeta_1 DTB_{i,1t} + \zeta_2 DTB_{i,2t} + \varepsilon_t \qquad (1)$$

The four models tested are presented in table 2 together with the principal results of the structural break analysis. The models include dummy variables in the trend ($TDUi_t$) and in the level (DUi_t), which take the values $TDUi_t = (t - DUi_t)$ and $DU\ i_t = 1$, if $t \geq TBi$ and 0 otherwise, TBi being the moments in time of rupture.

TABLE 2

STRUCTURAL BREAKS FOR THE LOGARITHM OF THE AGRI-FOOD TRADE SERIES BY VOLUME, 1951-2000

	TB Additive outlier model			**TB Innovational outlier model**		
	AO (1)	**AO (2)**		**IO (1)**	**IO (2)**	
	1981	1973	1988	1985	1975	1985
World	(0.946)*	(0.753)*	(0.487)*	(0.011)	(0.015)	(0.020)
	1980	1969	1987	1957	1966	1983
Europe	(1.271)*	(1.071)*	(0.694)*	(0.028)	(0.058)**	(0.038)**
North and	1973	1973	1992	1968	1968	1991
Central America	(0.876)*	(0.776)*	(0.340)*	(0.060)***	(0.083)**	(0.055)***
	1995	1959	1997	1995	1956	1994
Africa	(0.012)**	(0.539)*	(0.193)*	(0.016)	(0.121)**	(0.069)**
	1989	1975	1993	1990	1970	1990
Former USSR	(0.471)*	(-0.121)***	(0.856)*	(0.341)*	(-0.222)*	(0.527)*

The ***additive outlier model*** model which incorporate structural changes require a regression of the form:

$$\overline{y}_t = \sum_{i=1}^{k} \omega_{1i} DT_{b1,t-i} + \sum_{i=1}^{k} \omega_{2i} DT_{b2,t-i} + \alpha \overline{y}_{t-i} + \sum_{i=1}^{k} \theta_i \Delta \overline{y}_{t-i} + e_t$$

Where DTbmt = 1for t = Tbm +1 and o otherwise, for m=1,2. No intercept is necessary as is mean zero. This regression is then estimated over feasible pairs of Tb1 and Tb2, searching for the minimal t-ratio for the hypothesis α =1; that is the strongest rejection of the unit root null hypothesis.

The equivalent model tor the ***innovational outlier model*** (gradual change) expresses the shocks to the series (the effects of δ_1, δ_2 above) as having the same ARMA representation as other shocks to de model, leading to the formulation:

$$y_t = \mu + \delta_1 DU_{1t} + \delta_2 DU_{2t} + \phi_1 DT_{b1,t} + \phi_2 DT_{b2,t} + \alpha y_{t-i} + \sum_{i=1}^{k} \theta_i \Delta \overline{y}_{t-i} + e_t$$

Where again an estimate of α significantly less than unity will provide evidence against the I(1) null hypothesis. In each of these models, the breakpoints Tb1, Tb2 and the appropriate lag order k areunknown. The breakpoints are located by a two–dimensional grid search for the maximal (most negative) t–statistic for the unit root hypothesis (α=1), while k is determined by a set of sequential F –tests

Critical values to test for the unit root are -4.94 for "IO" models and -5.57 for "AO" models (t-ratios significant * at 1%, ** at 5% and *** at 10%)

[(Clemente *et al,* 1998) T=100, P=5]. Coeficientes are in brakets.

The main result was that the aggregate series for world agricultural and food trade displays two "AO2" type structural breaks around 1973 and 1988, which confirms both the unit root and structural break hypotheses (the t test is below the threshold at the level of 1 per cent). Hence, we may affirm that international agricultural trade suffered two temporary shocks (given that these points are not found to be significant in the IO models) in the most turbulent years of the period marked by the two energy crises and their impact. These break points are used to split the evolution of the series over time into periods.

Phases in the evolution of international agricultural trade

Based on this econometric analysis, the evolution of international agricultural and food trade may be split into three phases from the aggregate standpoint. The first, which lasted from 1951 until 1973, saw trade grow at unprecedented rates across the board. In the second phase, from 1973 until 1988, there was a sharp slowdown in the trade in farm products, while in the third, 1988-2000, there was a return to the growth path that started after World War II.

Compared with earlier cycles, the period as a whole saw a tremendous acceleration of agricultural trade, which grew much faster than it had ever done in the past (table 3).

TABLE 3

GROWTH IN AGRI-FOOD TRADE, 1850-2000 (BY VOLUME)
(COMPOUND ANNUAL GROWTH RATE)

1850-1902	3.70
1903-1938	1.36
1951-2000	4.12
1951-1973	4.89
1973-1988	3.19
1988-2000	3.90

Source: 1850-1902 Lewis (1981); 1903-1938 Aparicio et al. (2009) and 1951-2000 our calculations based on FAO (1947-2000) and FAOSTAT (2004).

The data for 1850-1902 refer to primary products and include certain non-agricultural products.

The growth rate for the period 1951-2000 was higher than that of the first globalisation and the early decades of the twentieth century, when agricultural trade was profoundly affected by the shocks of World War I and the Great Depression. World War II also had a tremendous impact on world trade, which extended to both agriculture in general and agricultural and food trade flows[10]. As is well known, income levels did not return to their pre-war levels until the 1950s. However, the effects of the conflict varied widely depending on the group of countries concerned.

The war zones of Europe, the USSR, large parts of Asia and the Pacific and North Africa suffered worst and were forced to cut imports even as local agriculture was devastated. South America, other parts of Asia and some African economies also endured knock-on effects, as their traditional export markets shrivelled. Meanwhile, those countries like Canada, the United States, Australia and Argentina that were fortunate enough to be far from the scene of the fighting became the principal suppliers of foodstuffs for their allies. In general, however, the War had a severe impact on agricultural trade[11].

After the war, the world economy would accelerate at an unprecedented pace especially in the years of capitalism's golden age, as generalised growth, liberal trade policies, exchange rate stability under the Bretton Woods system and improved transport systems drove international trade at breakneck speed.

The trade in agricultural products also grew strongly in the second half of the twentieth century. The main cause of this expansion was the growth in world income, although Regional Trade Agreements and, especially, the creation of the

10. Tracy (1989)
11. Brassley (forthcoming).

European Union also played a major role. Finally, falling agricultural prices and the exchange rate stability that lasted until the early 1970s also contributed to growth in agricultural trade, although to a much lesser extent[12].

In this context of general growth, agricultural trade expanded swiftly between 1951 and 1973, although the initial recovery from the collapse of World War II was slow, and trade flows did not take off until the mid-1950s. Thus, the volume of trade in agricultural raw materials was still around 10 per cent lower in 1953 than it had been in 1937, although food trade was already almost 20 per cent higher than its pre-war level[13]. Farm trade thus grew faster in this period than it had at any other time since the early 19th century, despite the increasing inelasticity of demand and high levels of protectionism in markets.

The strong economic growth that had begun after the Second World War notoriously came to an end in the early 1970s. The world economy was wracked by the energy crisis, inflation, exchange rate instability resulting from the collapse of the Bretton Woods system, slower growth in the industrialised nations and a general atmosphere of uncertainty. Thus, the exchange rate stability of the period 1950-73 had created favorable conditions for trade, but in 1974 the context shifted to one of volatility and exchange rate risk. Some scholars have argued that this instability was more important for agricultural trade than for trade in manufactures[14].

Despite recession, instability and rising trade barriers, agricultural exports responded strongly to the first energy crisis, and average annual growth of 5.1 per cent was achieved between 1974 and 1980, the highest figure in the second half of the twentieth century.

The early 1980s saw an abrupt change in the international economic situation, until then characterised by liquidity in the financial markets and expansionist monetary and fiscal policies in many countries. The second oil crisis forced governments to toughen their monetary and fiscal policy, resulting in a painful economic slowdown that particularly affected developing countries. Demand for imports fell and problems of overcapacity emerged, reflected in the steep fall in international commodities prices. Meanwhile, international credit was frozen and many countries that had borrowed heavily were left unable to repay loans.

Structural adjustment programs were launched to mitigate the effects of the crisis, involving cuts in public spending, currency devaluation, the liberalisation of markets and privatisation of nationalised industries. Real wages declined together with social security benefits, while unemployment rose. The measures taken to combat the crisis also had their repercussions in agriculture. As had happened in the 1970s, many farmers fell victim to deterioriating terms of trade. As a result of

12. Serrano and Pinilla (2010).
13. Yates (1959).
14. Cho, Sheldon and McCorriston (2002).

lost income and restrictions on credit, farms were forced to shed jobs and cut their use of fertilizers and other inputs. All of these factors translated into falling agricultural earnings and considerable suffering in rural areas in many countries[15].

Agricultural trade increased very slowly in the early 1980s with average annual growth in agricultural exports of just 2.4 per cent between 1980-85, far from the rates achieved in earlier periods. The poor performance of trade compared to the economy in general suggests the existence of significant constraints.Trade growth slowed in part due to the stagnation of demand[16]. The two main reasons for the stagnation of demand for foodstuffs were the decline in the rate of growth in the world population and the saturation of what had become a mature market. Between 1979 and 1999, 61 per cent of the world's population came to enjoy high levels of nutrition, represented by consumption of over 2,700 Kcal/person/day[17].

At the same time, growth in agricultural trade was blocked by increasing protectionism. In an effort to shield farmers from the crisis, Europe, Japan and the United States, among others, raised non-tariff barriers sharply and sought to isolate their agriculture from falling prices and volatility[18].

The result was to slow growth in agri-food trade to its lowest rate in the second half of the 20th century between 1973 and 1988 (table 3).

Finally, the years between the 1980s and 2000 could be described as the most significant political transformation since the end of the Second World War. A sequence of extraordinary events resulted in the collapse of Communism in the Soviet Union and Eastern Europe, and the emergence of a new political, economic and trade order. The 1990s were characterised by wide divergence in the economies of the leading industrialised nations, the drive toward European integration (European Union), fast economic growth in the United States, a severe recession in Japan, and growth in many developing countries, especially China.

Two consequences of events in the preceding period were to have a positive influence on agricultural trade. These were the massive debts of many developing countries and the deterioration in the terms of trade. Those countries that had formerly operated policies penalising the agro-export sector now sought to expand production for export as a way of increasing revenues, despite slack international demand for agricultural goods in this period.

Between 1988 and 2000 the rate of growth in agricultural trade gradually recovered to around 3.9 per cent per annum, once more above growth in output and incomes. This rise in agri-food trade was favoured by lower trade barriers resulting from the liberalisation of international markets in agricultural products and

15. FAO (2000).
16. Cho, Sheldon and McCorriston (2002).
17. FAO (2002).
18. Estimates of nominal protection reveal the highest levels for the period (Aksoy 2005; DeRosa, 2004; Tyres and Anderson,1992), as well as rising non-tariff barriers (Laird and Yeats, 1988 and World Bank, 1995).

commodities, the impact of Regional Trade Agreements covering agricultural trade, and accelerating income growth after the crisis, especially in Asia, which would gradually become a major importer of agricultural products.

To end this section, we may note that the expansion of international farm trade was much faster than growth in world agricultural output, and agriculture was far more integrated in international markets than it had been during the period of the first globalisation. Nevertheless, the process of integration was by no means constant, and it was twice brought to a halt by oil crises, especially the second[19].

Agricultural vs. total trade

The rapid growth of agricultural and food trade looks less impressive, however, when it is compared with total trade (see table 4). Agricultural products had played a key role in the enormous expansion of international trade that began in the mid-nineteenth century and ended with the outbreak of World War I, but in the period from 1950 to the present it has gradually lost share in total world trade flows. This decline was particularly sharp between 1951 and 1973, when the share of agricultural trade in total world trade shrank by 17.3 points in volume and 25.5 points in value terms. The fall in the volume of trade eventually levelled off as the gap with the rate of growth in total trade narrowed again (compound annual growth of 3.5 for agricultural trade and 4.9 for total trade). However, the value of agricultural trade continued to slide, as the bottom dropped out of relative prices.

TABLE 4

LONG-RUN TRENDS IN INTERNATIONAL INCOME AND TRADE
(COMPOUND ANNUAL GROWTH RATE)

	1951-2000	1951-1973	1973-2000
World GDP (USD 1990)	3.9	4.9	3.1
Total trade (value)	9.7	10.0	9.4
Agricultural and food trade (value)	5.6	5.6	5.5
Share of agric. and food trade by value	43.0 (1951)	17.6 (1973)	6.7 (2000)
Total trade (volume)	6.7	8.9	4.9
Agricultural trade (volume)	4.1	4.9	3.5
Share of agric. and food trade by volume	29.6 (1951)	12.3 (1973)	8.5 (2000)

Source: World GDP data in Maddison (2001). Trade data: own work based on FAO (1947-2000), FAOSTAT (2004), UN COMTRADE (2003) and WTO (2003).

The share of trade was calculated for 1951, 1973 and 2000.

19. Aparicio et al. (2009).

One of the main reasons for the declining importance of agricultural trade was unquestionably the relative deterioration of prices[20]. That falling relative prices were a serious problem is clearly apparent in view of the sharp loss of share in total trade measured in terms of value, compared to the more moderate, though still significant, decline in volume terms.

Between 1951 and 2000, agricultural prices grew at an average annual rate of 1.8 per cent, well behind the average 2.8 per cent increase in general international trade prices. As a result, the real prices of agricultural exports suffered considerable deterioration in the second half of the twentieth century, while the real prices of agricultural and food products fell at an annual rate of 1.02%[21].

According to the results of the econometric analysis, the sharpest fall in the real prices of farm products out of the three sub-periods considered occurred in 1973-1988, when the average annual rate of decline was 2.34%. This period was marked by sharp fluctuations and divergence from the general international trade price index. This stage began with fast growth in agricultural prices lasting until the early 1980s, followed by a sharp fall lasting until 1985 associated with strong protectionist distortions in the markets, stagnation of demand and oversupply. However, growth levels were significantly lower than for general international trade prices, resulting in a spectacular deterioration in real agricultural prices. Various studies define the 1970s as a key moment for the terms of trade in agri-food products.[22]. The real price index of agricultural and food products displays a structural break in 1976-1977 (in terms of both level, AO2, and trend, IO2), which suggests a lag in the general impact on the world economy caused by the first oil crisis of the 1970s[23].

The contraction was much slower in both the earlier sub-period (1951-1973) and in the subsequent one(1988-2000), when agri-food product prices remained relatively stable and approximately in step with general international trade prices, falling at annual rates of 0.3% and 0.42% respectively.

The series measuring the evolution of agricultural trade in real terms (i.e. the purchasing power of agricultural exports) is much less dynamic than the volume series because of the performance of agricultural prices. As a result, agricultural trade grew at approximately the same rate in real terms as in volume terms until 1973 (since price performance was only slightly below the level for general trade). Thereafter, however, real performance was significantly worse because of the relative deterioration of agricultural prices. Thus, average annual growth was just 1.2 per cent between 1973 and 2000, well below the 3.4 per cent growth in volume

20. A voluminous literature exists on the performance of long-run primary product prices and verification or otherwise of the Singer-Prebish hypothesis. See, for example, Nguyen (1981), Diakossavas and Scandizzo (1991), Spraos (1980), Grilli and Yang (1988), Haddas and Williamson (2003) and Ocampo and Parra (2003 and 2010).
21. Serrano and Pinilla (forthcoming a).
22. Ocampo and Parra (2010).
23. Serrano and Pinilla (forthcoming a).

Having considered the significant loss of agriculture's share in world trade caused by the deterioration of real prices, let us now look at the decline in volume terms, regardless of price changes. As we have already said, income growth and its impact on demand was a key factor in the evolution of trade.

While agricultural trade grew more slowly on an annual basis than world GDP between 1951 and 1973, income and trade growth slowed significantly after the first energy crisis, increasing at a roughly similar rate. From the mid-1980s onwards, however, agricultural trade grew faster than world GDP, but considerably more slowly than total trade (see table 4).

It is not surprising, then, that agricultural trade grew more slowly than total world trade in the long run, and therefore lost share in international markets, as the low income elasticity of demand for the majority of agricultural products acted as a brake on trade, preventing a more dynamic performance[24]. There is a sharp contrast here with manufactured goods and services, and this is certainly a key explanatory factor for the evolution of agricultural trade in a context of enormous growth in world income.

We therefore propose to examine the extent to which the differing growth rates of agri-food and total trade can be explained by differences in income elasticities, which we shall quantify using demand equations[25]. Obviously, the evolution of farm and total trade was influenced by other significant factors, but we shall here concentrate exclusively on income, following Irwin (2002). Studies of the determinants of international trade, such as Jacks, Meissner and Novy (2009), show that the factor with the greatest explanatory power in the second half of the twentieth century is income. Coyle et al. (1998) Regmi and Dyck (2001) and Serrano and Pinilla (2010) have shown that income was also the main determining factor in the evolution of international trade in agricultural products[26].

The econometric strategy we have employed to explore the short- and long-run dynamics of the relationships between total world export volume and world real income, and between world agricultural export volume and world real income is based on the analysis of cointegration between the variables.

24. Gelhlar and Coyle (2001), Yates (1960), Yu, Hertel, Preckel and Eales (2002), Reimer and Hertel (2004) Cranfield, Hertel, Eales and Preckel (2003), and Regmi, Deepak, Seale and Bernstein (2001) among other authors, have confirmed the low income inelasticity of these products.

25. An alternative strategy is employed in Serrano and Pinilla (forthcoming b). In this case, it is bilateral trade flows that are analysed rather than total trade flows. The period is shorter (beginning only in 1961) due to the lack of earlier data and not all trade flows are included. This allows the use of a gravity equation and panel data econometric analysis.

26. Serrano and Pinilla (2010) use other significant variables to explain the evolution of the volume of international farm trade. Aside from income, the most important, these include the prices of agricultural products, exchange rate volatility and the existence of Regional Trade Agreements (RTAs). While the exclusion of all variables except income in this study considerably reduces the explanatory power of the model (r^2 drops from 0.85 to 0.36), it does not significantly affect income elasticity, which is the variable we wish to compare with total trade. Thus, elasticity of demand to long-term income increases from 0.90, obtained in this study, to 1.05 in Serrano and Pinilla (2010).

For the period 1951-2000, then, we first propose a model in which the dependent variable is the log of total world export volume (TX) and the independent variable is the log of world real GDP (Y). As both variables are expressed in logarithms, the regression coefficients are interpreted as elasticities.

To avoid the problem of spurious regressions, we first consider the order of integration of data series. Based on an analysis of the cointegration order of these variables by way of the augmented Dickey-Fuller test and the Philips-Perron test, we may conclude that the volume of total trade and real GDP are of integration order one I(1). We have tested the hypothesis of structural change following the same methodology as used for agricultural trade. The main result was that the total trade series displays two "AO2" type structural breaks (additive outliers) around 1969 and 1989, the income series displays two "AO2" type structural breaks around 1968 and 1985[27]. We have also studied whether these variables are cointegrated. Using the Engle-Granjer and Johansen tests at the 5 per cent significance level, our results suggest there is a long term-relationship between the volume of total trade and real GDP. As the variables are cointegrated, they will be better expressed in an error correction model (ECM). This model is made up of two parts, one describing the short-term relationship between the variables (expressed in differences) and the other the long-term equilibrium relationship. In the first model we estimated, the main exogenous variable was income, but we also included four dummies for the years in which the two series display structural breaks. However, none of these proved significant and they were therefore eliminated[28]. Using non-linear least squares, the resulting final model is:

$$\Delta TX_t = 2.09\ \Delta Y_t - 0.12\ (TX_{t-1} + 2.88 - 1.63 Y_{t-1})$$

(6.92) (1.71) (-6.13) (16.51)

$R^2 = 0.59$
$LM\ (1) = 2.44\ [0.12]$
$LM\ (2) = 3.93\ [0.14]$
$White_{Het} = 15.95\ [0.07]$

(t-ratios in brackets and p-values in square brackets)

27. The results of these tests are available from the authors on request.
28. These results are available from the authors on request.

We repeated this econometric strategy with the log of world agricultural export volume as the dependent variable and the independent variable, again Y, as the log of world real GDP. Both variables are again integrated in order 1 I(1) and a long-term relationship was found to exist. As we explained at the beginning of this paper, the series for world agricultural and food trade displayed two "AO2" type structural breaks around 1973 and 1988. Initially, we designed a model which included four dummy variables for the years in which both series show structural breaks as exogenous variables, in addition to income. As none of these dummies proved significant, however, they were eliminated from the model.[29]. The resulting final error correction model (ECM) is:

$$\Delta AX_t = \underset{(2.30)}{0.69}\ \Delta Y_t - \underset{(-2.61)}{0.75}\Delta Y_{t-1} - \underset{(2.33)}{0.14}\ (AX_{t-1} - \underset{(8.30)}{0.73} - \underset{(1.26)}{0.90} Y_{t-1})$$

$R^2 = 0.36$
$LM\ (1) = 0.50\ [0.48]$
$LM\ (2) = 1.73\ [0.42]$
$White_{Het} = 22.64\ [0.07]$

(t-ratios in brackets and p-values in square brackets)

The most interesting result obtained from the comparison between these two models is the huge difference between long-term world real income elasticities for total trade (1.6) and agricultural trade (0.9) (table 5). Both are clearly significant at any level. The negative sign of the error correction term shows that the endogenous variable tends toward a long-term equilibrium relationship with world real income. There are no problems of heteroskedasticity or autocorrelation in either model. We used the Chow test to seek structural changes occurring within the sample period. The results showed that there are no structural changes.

The close relationship between total trade and income is not surprising in view of the findings of other studies. However, the relationship between agricultural trade and income is interesting no less for its relative inelasticity than for the still significant influence of income growth on the evolution of commerce in agricultural products.

The low income elasticity of demand for the majority of agricultural products may be explained by economic, demographic and socio-cultural factors.

29. These results are available from the authors on request.

TABLE 5

LONG RUN RESPONSE OF TRADE WITH RESPECT TO INCOME

Agricultural trade	Total trade
0.90	1.63

In the first place, Ernst Engel showed long since that the share of household budgets represented by basic necessities such as food and clothing declines as incomes rise. There is a similar effect in the diversification of foodstuffs. Schmidhuber studies the phases of nutritional transition[30]. The first steps in this process may be described as "expansion" effects with a rapid increase in the intake of additional calories from cheap, vegetable foodstuffs. This first stage was completed in the developed countries of Western Europe before World War II. During the period studied, the market for such mature products was in fact saturated (between 1979 and 1999, 61 per cent of the population attained high levels of nutrition, represented by intake of over 2,700 Kcal/person/day)[31]. The second, "substitution" stage lasts longer and involves a switch from high-calorie basic carbohydrates to animal fats, vegetable oils and sugar, all of which require more processing.

In the second place, demographic factors such as increasing urbanisation have resulted in the stagnation of demand for agricultural products. The intense process of urbanisation has also reinforced other changes in consumption patterns, leading to a drop in the intake of calories per person[32].

Finally, certain socio-cultural factors are also important to explain declining demand for agricultural products as a consequence of the fall in calorie intake. According to Delpeuch (1989), consumption has been progressively "westernised" since the 1960s, giving rise to major changes in diet. Migration, new food distribution and marketing methods and ongoing urbanisation are behind this globalisation of food habits.

Changes in the geographical distribution of trade

The reversal of traditional roles in agricultural and food trade

International economic integration made a comeback in the second half of the twentieth century, but the North-South pattern forged in the period of the first globalisation was gradually replaced by a trade pattern based principally on exchanges

30. Schmidhuber (2003). For a more detailed discussion of nutritional transition and changes in diet, see Chaudri and Timmer (1986), Yates (1960), and Gehlhar and Coyle (2001).
31. FAO (2002).
32. World urban population grew from 30% in 1950 to 47% in 2000.

of manufactures between developed nations[33]. In the case of agricultural trade, flows of processed goods between high income countries grew significantly[34]. In general, the industrialised nations supported their agriculture in pursuit of food self-sufficiency, a goal that most had adopted after the scarcity of the war and post-war years.

This strategy, which Díaz-Bonilla and Tin (2002) call *Import Substitution Agriculture* (ISA), was deployed by all of the world's leading countries, with Europe and Japan at the forefront. Access to new technologies made self-sufficiency possible, reduced the volume of imports and even allowed these countries to become net exporters of agricultural products from very early on in the period[35]. The fall in European imports, especially bulk products, in relative terms is a clear example of this process, as may be observed in tables 6 and 7, which reflect the main changes in the regional distribution of trade in agri-food products. The counterpoint was the rise in food imports to Asia, which was undergoing a far-reaching process of industrialisation, demographic growth and urbanisation. Thus, Asian imports of farm products and foodstuffs grew across the board, and the continent's share increased in the four product categories considered (bulk products, plantation products, high value foodstuffs and processed agricultural products).

In the case of exports, changes in the geographical make-up of trade flows are even more marked. Governments in the developed nations provided agriculture with more support than any other sector, while many developing nations discriminated against farmers[36]. This was especially the case in South America, where many countries opted early on for policies based on industrialisation and import substitution, which severely penalised their agro-export sectors[37].

As a result, the countries that were most dependent on the export of bulk products (Africa, Oceania and South America) saw their share in world agricultural trade fall. Thus, both Africa and South America experienced a progressive decline in relative share in the regional distribution of exports. Moreover, some of these countries not only saw their exports fall in relative terms, but also experienced a sharp deterioration in the ratio of agricultural exports to imports. Thus, Africa and Asia became net importers of agricultural products where they had once been net exporters[38].

The flip-side of this decline was the increasing share of high income nations, and in particular the rise of European exports, which grew from 32 per cent of the world total in the 1950s to 44 per cent by the end of the century. This growth in

33. Findlay and O'Rourke (2007), pp. 508-512.
34. Hertel *et al*. (1999).
35. Hayami and Ruttan (1985).
36. The export sector was penalised in many countries of the developing world, which applied export duties and quota systems, and removed producer price controls (Krueger, *et al.* 1998).
37. Lindert (1991), Diaz-Bonilla and Tin (2002), and Diaz-Bonilla and Reca (2002).
38. Countries specialising in exports of tropical products (e.g. coffee, cocoa, cotton and sugar) suffered the most from changes in the composition of trade, especially in the 1980s (Daviron and Gibbon, 2002).

the share of European exports was achieved basically in the bulk and plantation products groups, while the region consolidated its already dominant position in processed products and high value foodstuffs.

In our opinion, the lion's share of this increase is explained by the combination of two factors. First, the rise in self-sufficiency was made possible by technological progress, high levels of protectionism and support for farming through the Common Agricultural Policy (CAP). Second, domestic markets were progressively deregulated, which greatly favoured the increase in intra-regional trade. The creation of the European Union as a common market is a case in point, as it brought about a spectacular increase in farm trade between the member States[39].

The antithesis of the European case is Latin America. The significant decline in this region's share is explained by four factors, namely the retention of exports due to the demographic boom, specialisation in low income elasticity products, the failure of agreements aimed at achieving regional economic integration, and the anti-export bias of economic policy[40].

Meanwhile, studies of Europe and Latin America using bilateral trade flows and gravity equations to examine the determining factors for agri-food trade in the second half of the 20th century have shown in both cases that technological advances in agriculture fostered export growth[41].

TABLE 6

PERCENTAGE REGIONAL DISTRIBUTION OF IMPORTS
OF AGRICULTURAL AND FOOD PRODUCTS (US DOLLARS, 1980)

Region	1952-59	1959-66	1966-73	1973-80	1980-87	1987-94	1994-00
Total agricultural and food products							
Europe	59.17	58.48	58.23	57.18	53.90	53.79	47.69
North and Central America	18.56	16.50	16.06	12.87	12.88	12.26	13.77
Oceania	0.94	0.89	0.88	0.81	0.82	0.89	1.02
Asia	14.00	16.95	18.40	21.30	23.79	25.88	29.14
South America	3.86	2.45	2.15	2.49	2.33	2.11	3.27
Africa	3.47	4.74	4.27	5.34	6.28	5.09	5.11
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

(continues)

39. Pinilla and Serrano (2009).
40. Serrano and Pinilla (2008).
41. Serrano and Pinilla (2008) and (2011).

TABLE 6

(*continuation*)

Region	1952-59	1959-66	1966-73	1973-80	1980-87	1987-94	1994-00
Bulk products							
Europe	62.22	57.19	55.72	53.12	48.46	46.73	37.93
North and Central America	7.81	7.21	6.81	6.10	7.03	8.42	11.83
Oceania	0.55	0.53	0.50	0.43	0.47	0.61	0.74
Asia	21.21	26.91	29.46	30.75	32.53	34.96	37.12
South America	2.94	3.02	2.87	3.28	3.33	3.16	4.84
Africa	5.27	5.13	4.65	6.33	8.19	7.11	7.54
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Plantation products							
Europe	45.44	46.67	48.79	49.41	53.78	54.90	49.07
North and Central America	35.43	31.50	29.14	24.20	20.44	17.20	18.26
Oceania	1.20	1.34	1.24	1.19	1.09	1.15	1.26
Asia	10.17	13.11	14.63	17.95	18.03	20.50	23.72
South America	4.50	1.74	1.49	1.82	1.63	1.61	2.49
Africa	3.26	5.64	4.70	5.44	5.03	4.69	5.19
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
High value foodstuffs							
Europe	71.17	70.28	67.73	65.99	59.87	62.30	57.55
North and Central America	14.52	15.42	16.76	13.32	14.52	13.45	13.84
Oceania	0.54	0.60	0.74	0.78	0.84	0.75	0.83
Asia	6.49	8.09	10.19	14.51	18.93	19.41	23.23
South America	4.19	2.23	1.78	1.97	1.57	1.33	2.18
Africa	3.09	3.38	2.80	3.43	4.27	2.76	2.37
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Processed products							
Europe	60.93	62.40	62.54	60.69	55.93	54.60	48.78
North and Central America	20.27	18.77	17.58	13.71	14.09	12.25	12.67
Oceania	1.98	1.53	1.44	1.28	1.22	1.30	1.45
Asia	8.20	9.12	11.28	15.77	19.78	24.73	29.30
South America	2.50	2.44	2.05	2.38	2.22	1.87	2.96
Africa	6.18	5.74	5.11	6.16	6.77	5.27	4.84
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Own work based on FAO (1947-2000) and FAOSTAT (2004).
Europe includes the USSR and, after 1991, Russia and the ex-Soviet economies.

TABLE 7

PERCENTAGE REGIONAL DISTRIBUTION OF EXPORTS
OF AGRICULTURAL AND FOOD PRODUCTS (US DOLLARS, 1980)

Region	1952-59	1959-66	1966-73	1973-80	1980-87	1987-94	1994-00
Total agricultural and food products							
Europe	32.32	31.43	36.32	39.67	41.45	46.31	44.28
North and Central America	24.45	25.46	23.81	25.62	24.75	20.69	20.58
Oceania	8.05	7.13	6.40	5.56	5.53	5.08	5.28
Asia	14.20	15.06	13.95	12.92	14.27	16.21	16.94
South America	12.57	9.59	9.22	8.66	8.62	7.74	9.03
Africa	8.40	11.32	10.30	7.56	5.37	4.27	3.90
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Bulk products							
Europe	23.51	24.59	29.81	30.58	33.43	40.46	37.43
North and Central America	30.12	33.46	33.41	39.99	36.99	30.34	29.83
Oceania	10.91	10.00	8.72	7.65	8.06	7.44	7.23
Asia	13.95	13.43	12.67	10.26	12.14	14.44	15.53
South America	9.76	6.92	6.10	5.81	5.49	4.94	6.93
Africa	11.75	10.58	9.29	5.71	3.89	3.04	3.05
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Plantation products							
Europe	18.71	13.73	14.81	16.62	20.19	32.30	34.82
North and Central America	19.20	23.04	20.36	22.08	23.74	16.16	13.12
Oceania	2.05	2.53	3.09	3.29	3.01	2.87	3.76
Asia	23.50	25.63	22.21	21.09	21.25	23.46	23.50
South America	24.88	24.50	20.02	18.70	16.69	13.24	04.35
Africa	11.75	10.58	19.50	18.22	15.11	12.05	10.45
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
High value foodstuffs							
Europe	53.83	52.64	55.04	60.52	59.96	60.51	55.89
North and Central America	15.02	13.65	12.24	11.46	12.15	13.22	16.69
Oceania	14.82	11.39	9.62	7.51	7.08	6.48	6.90
Asia	4.97	8.87	10.83	11.07	12.20	12.22	12.03
South America	9.23	7.35	6.82	5.43	6.11	5.77	6.61
Africa	2.13	6.09	5.45	4.01	2.49	1.90	1.87
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

(continues)

TABLE 7

(*continuation*)

Region	1952-59	1959-66	1966-73	1973-80	1980-87	1987-94	1994-00
Processed products							
Europe	43.87	45.79	52.64	53.49	52.09	50.42	47.74
North and Central America	28.70	26.56	24.92	22.10	20.41	18.96	18.53
Oceania	1.49	1.09	0.98	1.04	1.18	1.42	1.79
Asia	11.27	11.33	9.92	11.54	14.10	17.54	19.42
South America	3.66	4.69	4.60	7.59	9.85	9.74	10.48
Africa	11.08	10.60	6.93	4.24	2.36	2.09	2.05
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Own work based on FAO (1947-2000) and FAOSTAT (2004).
Europe includes the USSR and, after 1991, Russia and the ex-Soviet economies.

Econometric analysis of the regional series: periods and discontinuities

In order to throw light on the regional diversity of trends, let us perform an econometric analysis of the regional international agricultural trade series, as we did at the beginning of this study.

We have carried out conventional unit root tests on the regional agricultural and food export series by volume for the period 1951-2000 in order to identify the existence of structural shocks. Our finding is that the series for Europe, North and Central America, Africa and the USSR are non-stationary. This is not so, however, in the cases of Asia, Oceania and South America, all of which exhibit stationary series in the Philips-Perron test (table 1).

Secondly, we tested the hypothesis of structural change to establish the nature of the discontinuities found. The main finding here is the mixed performance of the different economic regions, which is associated with significant changes in the institutional context. Europe, North and Central America, Africa and the former USSR display both AO2 and IO2 type structural breaks in different years (table 2).

Changes in level and trend appear in Europe around 1966-69 and 1983-87. These appear to be more closely linked to the boost to trade delivered by the internal liberalisation of the European Economic Community/European Union (EEC/EU) than to the shocks sustained by the world economy. There is also a change of level and trend around 1991-92 in North and Central America coinciding with the creation of the North American Free Trade Agreement (NAFTA) in

1992. This region also saw an earlier change in trend in 1968, which could be explained by the rise in European intra-regional trade due to the development of the EEC and the resulting deviation of North American trade, which had traditionally been a major supplier of Europe[42].

Africa, meanwhile, stands out for the presence of early shocks before the 1960s, which may be related with decolonisation, a process that affected the majority of the countries in the region and had a significant impact on foreign trade, reflected in a loss of exports to international markets almost from the outset[43].

Finally, a major change of level and trend is also observable in the former USSR in the 1990s. Thus, the explosion of commerce in the region in the early years of the decade was more a result of the disintegration of the Soviet Union into independent states than of any actual growth in trade. Having recovered from the initial convulsion, however, the new states have benefited from the opportunities generated by the transition from closed to more open economies[44].

The major boost to trade in agricultural and food products during the golden age of capitalism was, basically, a consequence of the general growth in incomes in all of the world's economic regions, as well as the new scenario of international cooperation[45]. In this context, income growth in Europe and Asia played a key role. While the former saw a return to pre-war levels followed by strong growth thereafter, the rise in Asia's income was a consequence of rapid demographic growth, rising urbanisation and swift industrialisation in the East Asian nations. In Europe, meanwhile, the creation and development of the EEC/EU also played a crucial role.

This muscular growth was cut short in the early 1970s, however. The world economy was hit by successive energy crises and ensuing restructuring. After 1973, supply-side surpluses became an ongoing problem, especially in the 1980s, and this translated into a sharp deterioration in real prices for the products concerned in agricultural trade. While, the more developed countries sought to isolate themselves by subsidising their farmers and raising trade barriers, farming in less developed regions suffered and their exports dropped sharply[46].

There were two main exceptions to this stagnation of trade. On the one hand, exports from the Asian region continued to rise in a context of strong economic growth. On the other, the high level of protectionism in the EEC/EU, support for farming through the Common Agricultural Policy (CAP) and the accession of new members to the club combined to allow a major expansion of intra-regional trade[47].

42. Vollrath (1998).
43. Karshenas (2001).
44. OECD (2004).
45. Serrano and Pinilla (2009).
46. Tyres and Anderson (1992); Karshenas (2001).
47. The European Union became the world leader in the trade in processed and value added food products, the fastest growing goods in agricultural and food trade in this period. See Pinilla and Serrano (2009).

The return to growth occurred in the 1980s with Asia playing a leading role, as both population and incomes continued to rise. Meanwhile, two major institutional changes became increasingly important. The first of these was the Uruguay Round of the GATT (1986-94), which represented the first attempt to achieve multilateral liberalisation in agricultural trade in the whole of the period. However, the effects were slow and slight. The second key change was the proliferation of regional trade agreements (RTA), which at least partially followed the path set by the EEC/EU[48]. Even so, only NAFTA succeeded in significantly fostering trade flows.

Conclusions

This paper charts the significant growth in the volume of agricultural trade in the second half of the twentieth century, which was even faster than the expansion that had happened in the period of the first globalisation. This rapid growth in agricultural trade even exceeded output at a time when new agricultural technologies were being adopted (the "green revolution" and mechanisation), and this was a crucial factor for the development of the sector[49]. There can be no doubt, then, that these were golden years for agricultural trade, because the difference between growth in agricultural trade and output substantially raised the ratio between them. This period was characterised by the integration of markets, ever closer connections between producer and consumer regions and a general surge in trade flows.

These developments fall into three clearly distinguishable phases. The first begins in 1951, as the international economy began to recover from the effects of World War II, and ends in 1973 with the outbreak of the oil crisis. Trade expanded astonishingly fast in this period compared to the growth rates for the nineteenth and twentieth centuries. However, the two energy crises and the turbulence of the late 1970s and early 1980s marked a period of instability and slower growth. Renewed stability and faster growth finally arrived in 1988 as the world economy again embarked on an ascendant path, although this expansion was always less than in the golden age of capitalism.

The situation, however, appears much more gloomy if we compare the growth in agricultural trade with total world trade. Where agricultural trade had been central in the first great expansion of international trade that began in the mid-nineteenth century and ended with World War I, the period from 1950 through to the present has witnessed a gradual collapse in the share of total trade represented by agricultural products. While agricultural trade grew at an annual rate of 6.0 per

48. Frankel, (1997); Sharma and Chua (2000). MERCOSUR in 1988, NAFTA in 1992 (formerly CUSTA), CER in 1983 and AFTA (formerly ASEAN) in 1991.

49. Federico (2005).

cent in current value, total trade expanded by 9.8 per cent. The same occurred with the volume of trade. Thus, agricultural trade grew by 4.1 per cent but total world trade by 6.8 per cent. Hence, agricultural trade lost a significant share of total world trade.

This problem was particularly acute during the period of the greatest expansion of international trade (1951-73), when the share of agricultural exports fell sharply in relation to total trade, losing 19.9 points by volume and 21.2 points in value terms. This fall slowed after 1973, mainly due to the rising volume of trade flows, and the average rate of growth in volume was similar to growth in total trade (5.0 per cent for total trade and 3.7 per cent for agricultural trade).

In view of the different rates of growth in volume and value, we may conclude that the loss of share in both periods is explained both by the volume of trade flows and prices. In the first period (1951-73), the slower rate of growth in the volume of trade in agricultural products and the resulting sharp fall in the relative share of total trade by volume is the key factor, because agricultural prices remained relatively stable and the difference with the general price index for international trade was minimal. It was in these two decades, moreover, that the share lost by agricultural trade was greatest.

In the period beginning after the first energy crisis, the volume of international trade grew at a similar rate to total international trade, and it is prices that best explain the ongoing decline in the share of total trade represented by agricultural products.

The low income elasticity of demand played a key role in the steep decline in the share of total trade represented by agriculture in volume terms.

Finally, the second half of the twentieth century saw major changes in the share of agricultural trade accounted for by the world's regions, driven above all by the rising relative share of European exports in total world trade, at the same time as the share of other, traditionally exporting regions declined, with the exception of Asia.

In contrast, the relative share of imports accounted for by Europe fell sharply, where the continent had been the leading importer of agricultural products in the early 1950s (a position it nevertheless retained), while Asian imports rose very significantly.

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APPENDIX

Volume trade and price series

We reconstructed export (FOB) figures from 1951 to 2000 at current values (in US dollars) for 6 economic regions and 19 product groups. We then aggregated countries and products to obtain two uniform and representative series. Data for the period 1951-1961 are based on the FAO Trade Yearbooks using the Standard International Trade Classification (SITC Rev.) for that period. Data for the period 1961-2000 are taken from the FAOSTAT database, which utilizes the Standard International Trade Classification (SITC Rev. 2). Both classifications are based on the Brussels Customs Tariff Nomenclature (BCTN). The problems arising due to the differences in these classification systems have been resolved using the UN COMTRADE database (2003) created by the Statistical Division of the United Nations, which includes data from both trade classification systems for the period 1961-2000.

The first series runs from 1951 to 1961, and reflects international trade for a representative sample of 66 countries. These countries accounted for approximately 80% of international trade in 1961 (82% of exports and 78% of imports).

The second series (1961-2000) reflects trade for all countries, since the FAO provide estimates when the actual data were unavailable. These series were then linked, on the hypothesis that the countries in the 1951-1961 sample accounted for a similar share of international trade in those years as in 1961-65.

To obtain a series for international agricultural trade by volume, we constructed price indices for the various product groups and employed them to deflate the relevant current price series. We obtained trade data at current prices and volumes for a sample of 66 agricultural trade products, based on the 1961-2000 figures obtained from the FAOSTAT database. In 1961 these products accounted for 82% of international agricultural trade, and this was still 60% in 2000, despite their share declining at the end of the period.

We then obtained the present unit prices for all these products, enabling us to construct a price index for each product for the period 1961-2000. Subsequently, we integrated these price indices with the United Nations estimates (1987) for the period 1950-1961, which reflect price movements for the same 66 products. Employing the 66 price indices calculated, we constructed weighted indices based on the product share for the 19 product groups. These indices were used to deflate the different series of product groups at current values and were then aggregated according to their weight in international trade in 1961, thereby obtaining a synthetic indicator of the evolution of agricultural and food prices. This index was then linked to the price index for total trade utilised by the WTO (2003) to obtain an index of real prices for agricultural trade.

The Evolution and Changing Geographical Structure of World Agri-food Trade, 1951-2000

Abstract

This paper examines the performance, evolution and changing geographical structure of agri-food trade in the second half of the twentieth century. We have constructed a set of both aggregate trade series and breakdowns by region. Furthermore, we perform econometric analyses of these new series to throw light on their behaviour and allow a clearer explanation of the evolution of world agricultural trade and the participation of different geographical regions. Finally, we compar the evolution of agri-food trade with total trade, and we propose a demand-side model to highlight the key role of the different income elasticities of both to explain their unequal evolution.

Key words: Agri-food Trade, Globalization, World trade.

La evolución y la cambiante estructura geográfica del comercio agroalimentario mundial, 1951-2000

Resumen

Este artículo analiza el comportamiento, evolución y la cambiante composición geográfica del comercio agroalimentario en la segunda mitad del siglo XX. Para ello hemos construido una serie agregada del comercio mundial de estos productos, así como un grupo de series regionales. Además hemos realizado un análisis econométrico de estas nuevas series para comprender mejor su comportamiento y poder llegar a una explicación más clara de la evolución del comercio agroalimentario mundial y la participación en él de las distintas regiones. Finalmente, hemos comparado la evolución del comercio agroalimentario con el comercio total, para lo que hemos planteado un modelo de demanda para destacar el papel clave de sus respectivas elasticidades de demanda con respecto a la renta para explicar su desigual evolución.

Palabras clave: Comercio agroalimentario, Globalización, Comercio mundial.